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The poles as planetary places

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Geodesy rarely makes headlines, but reports of human activities altering the orientation of the Earth's rotation drew significant media attention in early 2016: "Melting ice sheets changing the way the earth wobbles on its axis, says Nasa" (*The Guardian*); "Global warming changing tilt of Earth's spin axis" (*Sydney Morning Herald*); and "Climate Change is moving the North Pole" (*National Geographic*).[1] The corresponding reports explained that melting ice sheets in both polar regions, along with drainage of continental ground water near the equator, had altered the distribution of water mass on the planet, resulting in a slight but measurable shift of its axis of rotation. While the position of the Earth's axis relative to its surface has continuously moved small distances in both a cyclic and linear fashion since measurements began over a century ago,[2] the likelihood that human activity was a source of the latest shift gave it new significance: "For the first time", reported the *Sydney Morning Herald*, "the growing ecological footprint of humans has caused the whole planet to change its tilt."[3] At a time when we are still confronting the impact of our actions on the biosphere, this realization of our ability to inadvertently change the orientation of our planet in space, even by a tiny amount, gives a new dimension to the Anthropocene[4]: we live not so much *on*, now, but in uneasy partnership *with* a body spinning through space. We are, in a limited, blind but measurable way, steering Spaceship Earth.

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The headlines that appeared in 2016, following the scientific paper that generated them, focused on the position of the rotational North Pole relative to Earth's surface; nowhere is the South Pole's movement mentioned, although a shift in Earth's spin axis almost certainly means that its position too has been anthropogenically impacted. This asymmetry is no

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[1]"Melting Ice Sheets," *The Guardian*, April 9, 2016, https://www.theguardian.com/environment/2016/apr/09/melting-ice-sheets-changing-the-way-the-earth-wobbles-on-its-axis-says-nasa; Peter Spinks, "Global Warming," *Sydney Morning Herald*, April 15, 2016, http://www.smh.com.au/technology/sci-tech/global-warming-is-changing-the-earths-tilt-20160413-go5tgb.html; and Bryan Clark Howard, "Climate Change," *National Geographic*, April 8, 2016, https://news.nationalgeographic.com/2016/04/160408-climate-change-shifts-earth-poles-water-loss/.

[2]This "polar motion" with respect to the Earth's surface is distinct from the planet's axial precession .

[3]Spinks, "Global Warming," April 15, 2016.

[4]Interestingly, there is long-deliberated science fiction dealing with the converse phenomenon: axis shift causing climate change, and some intentional or unintentional human-caused magnetic pole shift. A search of online resources available. Diverse examples include Jules Verne's satire *The Purchase of the North Pole* (1889); J.M. Walsh's science fiction short story "When the Earth Tilted" (1932); and Allan W. Eckert's *The HAB Theory* (1976). Gustavus Pope's *Journey to Mars*, discussed below, raises the possibility with respect to both Earth and Mars (492). Deliberately caused magnetic pole shift has also seen fictional treatment, see e.g. Clive Cussler's thriller *Polar Shift* (2005).

surprise: in Western thinking, the South Pole is automatically considered secondary to the North; it is the "other Pole" lying "beneath" the Earth. In cultural analyses, the Antarctic Pole often comes as an afterthought, opposite and ancillary to its Arctic cousin, as its etymology suggests. The South Pole's supplementarity, however, makes it a particularly productive place through which to think about the ways humans have represented and imagined the Earth's relationship to outer space.

Here, we argue for the usefulness of considering Earth's geographic poles, and particularly the South Pole, as "planetary places". We use this term to refer to specific, storied locations on Earth's surface which are meaningful primarily in an (inter)planetary context. As Ursula Heise explores in *Sense of Place and Sense of Planet* (2008), an ongoing tension between local and global perspectives and attachments is central to contemporary ecocriticism (and the environmental humanities more broadly). The poles provide an unusual insight into this tension: as dimensionless points, they take the notion of the "local" to its literal extreme, but (as we demonstrate below) their significance derives from the planet itself, understood as an astronomical body – a globe – in relationship with other astronomical bodies. The poles are thus specific places that by definition evoke what Heise terms "sense of planet". They act as strong reminders of Earth's interconnectedness with unearthly (and also interior) spaces. In a reversal of the usual hierarchy, the South Pole is privileged in this categorization: as a solid location that can be built and lived upon, it has a stronger local place identity than the North Pole; moreover, as we argue below, its position "underneath" the Earth enables a defamiliarizing view of the planet with unique possibilities for the global, and the astronomical, imagination.

We begin our examination of the poles as planetary places by demythologizing the notion that they are well-defined points, looking not only to definitional complexities around the geographical poles but also at "other" poles, Earthly and unearthly. We then suggest ways in which the poles have enabled certain kinds of imaginative thinking about the planet in relation to the human. Given the space available here, we offer a series of snapshots rather than a panorama. This inevitably means overlooking important perspectives, in particular non-Western traditions – although we are aware that conceptions of the poles in other cultures, including those indigenous to the southern hemisphere, have existed for many thousands of years.[5] Here, we examine how the poles have been conceived and represented as spaces specially connected to outer space at particular historical points in the Western tradition. First, we focus on the theoretical coming-into-being of the poles, drawing on ancient Greek and Roman texts which defined Western views into the middle ages and well beyond. Our selection of texts in this section is dictated by the nature of our enquiry: as we are concerned with the poles as planetary places – as sites imagined in their relation to human beings and the world, and in relation to outer space – we do not have many relevant, surviving sources from antiquity at our disposal. Rather than the standard account of the history of the poles starting (once more) with the Greeks, we look specifically at the roots of (inter)planetary thinking about the poles, in so far as this can be identified in antiquity. We then look at several more recent imaginative texts in English, from the early modern period through to the end of nineteenth century. While heavily influenced by classical models of the Earth, these texts envisage new ways of thinking about the poles as portals

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[5]See e.g. Haynes, "Astronomy and the Dreaming," 59.

to its interior and exterior spaces. Since the mid-twentieth century, the South Pole has been a known, settled place with an ongoing, if transient, population. The contemporary inhabitation of the "other Pole", we conclude, draws on and enhances rather than detracts from its long-standing identity as a planetary place.

Earthly and unearthly poles

Conceptually and etymologically, the Arctic and Antarctic poles began as celestial features; as we discuss below, their terrestrial counterparts came into being belatedly, as elements of cosmic spatiality were projected onto the Earth's surface. Being points where the rotational axis meets its surface, they have long-held particular cultural significance as meeting places of the cosmic and the mundane.[6] The irony of the first human arrivals at the poles makes clear their intrinsically astronomical identity. In the south, faced with a vast icy plateau no different from what they had traversed for weeks, Roald Amundsen and his team had to spend days taking readings of the sun's position before they could confidently claim they had come close to the "absolute spot".[7] In the north, arguments raged over whether the Pole had or had not been reached, due to the lack of convincing records of equivalent observations. While culturally the Arctic and Antarctic poles took on all kinds of symbolic significances, empirically they existed as meaningful places primarily in relation to the skies.

The geographic poles, then, are perhaps the most "planetary" places on Earth – although "place" has to be used advisedly to describe invisible entities that exist, in Denis Cosgrove's words, "only in their scientific and cartographic representations" and are also "multiple – geographic, magnetic, geomagnetic, each indeterminate and mobile".[8] The geographic poles are themselves approximations: their fixed latitudinal positions of ninety degrees north and south do not correspond *exactly* to those of the rotational or "spin" poles, which shift continuously, but rather to an average of the rotational poles' movement over a particular period. However, with the difference between the two poles (geographic and rotational) being very small on a planetary scale, for non-technical purposes the two ideas are conflated, with the geographic poles signifying both the converging of the lines of longitude and the points around which the planet revolves.[9] Adding complexity to this picture are the magnetic poles, themselves conflated with the geographic poles for many centuries. Like their geographic counterparts, these ever-moving points act as signals of Earth's astronomical context, but in a far more spectacular way. The auroras visible in higher latitudes are produced by the planet's magnetic field interacting with a constant stream of charged particles from the sun.[10] This "solar wind" reminds us that space too has weather and climate, which can impact on human communication and other technological systems.[11]

There are other Earthly poles, particularly if we include the paleopoles that indicate where the north and south magnetic poles were located in past eras, but the majority of

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[6]Nelson, "Symmes Hole," 145.
[7]Amundsen, *The South Pole*, 121.
[8]Cosgrove, *Apollo's Eye*, 216.
[9]For this reason, in the following, we assume a rough equivalence of the geographic and rotational poles, unless otherwise stated.
[10]Auroral activity is usually concentrated in an oval-shaped band around the Geomagnetic Pole, which is itself different from the Magnetic Pole.
[11]Solar flares, for example, can create magnetic "storms" in Earth's atmosphere, which can interrupt communication satellites and electricity grids (Moldwin, *Introduction to Space Weather*, 1).

planetary poles are unearthly. A cosmological body with zero angular momentum, while not theoretically impossible, would be extremely unusual: everything in outer space, planets included, rotates around its own axis. And while some bodies might be too irregular to claim "poles" as we popularly conceive them, planets inside and outside our solar system can, with Mars also boasting icy polar caps.[12]

This raises the question of how the concepts of "south" and "north" apply to the rotational poles – often called "planetary poles" – of other astronomical bodies. Our solar system also has its own conventional north: the hemisphere (with respect to the system's invariable plane) on which the Earth's own celestial North Pole lies.[13] The International Astronomical Union defines the north poles of planets and satellites within the solar system with respect to that convention – including Venus, which rotates the opposite way to Earth by this definition.[14] On a larger scale, the Milky Way has its own rotational axis, its own celestial poles and its own north. Thus, the culturally specific but physically arbitrary north/south convention – with its up/down connotations – is magnified from the Earth up to the scale of the galaxy.

Polar thinking in the anthropocene

The anthropogenic axis shift that hit headlines in 2016 is a reminder to those working within the humanities and social sciences that the wholesale rethinking demanded by the Anthropocene – a rethinking of the ways we imagine, represent and analyse our relationship with the planet we inhabit – should not end at the point where, technically speaking, the planet does (its outer limit is frequently taken to be the Kármán line, about 100 km above the Earth's surface). The "planetary turn" in criticism, to use the phrase proposed by one recent collection, not only describes a focus on the "geo" – geopoetics, geocriticism and geohumanities – but also necessitates a new sensitivity to Earth as an astronomical body. As several contributors to *The Planetary Turn* note, the phrase is itself a pun on the Earth's rotation: its turns – its revolutions – are bound up with human ones.[15] "The most fundamental thing to say about a planet", as Paul Giles argues in his essay for the collection, "is not that it is a finite resource, a scientific hypothesis which may or may not be true, but that it is by definition always in rotation".[16] Yet, with threats to the biosphere so pressing, the relationship between Earth and outer space is often forgotten: "While the Anthropocene can be praised for knitting back together the human and natural worlds", write Valerie Olson and Lisa Messeri, "this separation is not entirely erased but rather displaced to spaces deeper and further beyond the Earth's surface". Building on work by Nigel Clark, Gayatri Spivak and others, they advocate "keeping 'the Anthropocene' connected to its spatial absences and physical others, including those that are non-*anthropos* in the extreme".[17]

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[12]We refer here to rotational poles; some but not all planets also have, like Earth, magnetic poles.
[13]Archinal et al., "Report of the IAU Working Group," 105. A system's invariable plane passes through its centre of mass and is perpendicular to the vector of its angular momentum.
[14]For other bodies, such as dwarf planets and comets, a different (although no less anthropocentric) convention applies: the right-hand rule, in which the "positive pole" lies in the direction a human thumb points to when the fingers of the right-hand curl in the direction of rotation (Ibid., 116).
[15]Moraru, "Decompressing Culture," 214.
[16]Giles, "Writing for the Planet," 145.
[17]Olson and Messeri, "Beyond the Anthropocene," 28, 43.

Despite its centrality to global climate systems as well as the key role its ice cores play in understanding and contextualising changes to these systems, Antarctica is frequently perceived as "other" to the planet of which it is part – not least in its use by space programmes as an analogue for extraterrestrial environments. This sense of being both within and without the space of Earth's surface also has a temporal counterpart. Focusing particularly on Antarctica, Elizabeth DeLoughrey notes that "polar geography – literally the ends of the earth – is vital to how we *visualize* the planet in terms of space and time". Fears about the planet's temporal end, she argues, "are given geographic shape at the poles" (something reflected in numerous narratives in which Antarctica becomes a final refuge for humans escaping from worldwide catastrophe.[18]) This spatial anticipation of the planet's temporal end, while enabled by military satellite technology, produces (as De Loughrey argues) an "encounter with the planet's alterity" that potentially resists the "homogenizing, geopolitical networks of power in which we are enmeshed" – a sense of what might be termed, drawing on Spivak's term, its planetarity.[19]

Even while De Loughrey recognises the uncanny, defamiliarizing potential of the polar regions, she nonetheless accepts their identity as margins, "literally the ends of the earth". Yet, given the spherical – or at least oblate spheroid – shape of the planet, no places on its surface can be have this literal identity. We argue here that, as specific points on the Earth's surface around which it revolves, the poles can be usefully understood and imagined as planetary centres and connectors, even while they have also been historically and culturally positioned as cartographical edges and geographical ends of human journeys. An astro-nomical perspective might emphasise not their marginality but their ability, as points on an invisible axis linking the planet's surface, interior and exterior, to evoke a connection between Earth and its "spatial absences".

The strong geopolitical connotations of the north/south binary applied to Earth give the south polar region particular resonance in this context: often presented via a series of negatives (not the north; not inhabited; not owned), it is an absence that evokes other absences in our spatial thinking. Giles warns that a "planetary turn" in criticism risks "foreshortening complex cultural and historical perspectives by focusing so insistently on one irreducible, all-encompassing sphere", pointing particularly to the "conundrum of an oppositional politics of the planet so clearly informed by American perspectives". Identifying narratives that, by contrast, produce an "uneasy consciousness of the planet as a disorienting phenomenon", Giles points to a seminal piece of Antarctic fiction, Edgar Allan Poe's *The Narrative of Arthur Gordon Pym of Nantucket* (1838) (as well as Herman Melville's *Moby-Dick*). The "phantasmagoric vision" of the South Pole that confronts Pym shows how "cartographic direction slides away under the pressure of the blank Antarctic", revealing "how conventional maps are always weighted in one manner or another".[20] This observation brings to mind the images of Earth from space – those produced by and productive of the Apollonian gaze described by Cosgrove[21] – that are inevitably flipped for general consumption when the Antarctic happens to be inconveniently "on top" in the original. Even those who critique images such as the "Blue Marble" (including De Loughrey and Heise[22]) reproduce the "corrected",

[18]See e.g. Leane, "Yesterday's Tomorrows," 340–43.
[19]De Loughrey, "Satellite Planetarity," 266, 275.
[20]Giles, "Writing for the Planet," 144–5.
[21]Cosgrove, *Apollo's Eye*.
[22]De Loughrey, "Satellite Planetarity," 263; and Heise, *Sense of Place*, 23.

Antarctica-down version without comment. A South Polar view – one which recognises the arbitrariness of this north-up/south-down orientation – has potential to defamiliarize conventional ways of seeing the Earth.

Working within the frame of the Anthropocene, then, means that critics in the humanities must extend their considerations not only to the nonhuman but also the non-Earthly environment. The poles, we argue in the following section, have in different historical stages in Western thinking acted as points through which Earth's connections with outer (and inner) space have been imaginatively conceived and explored.

The poles in antiquity: geographical theories and imaginings of place

Historically, the south poles, terrestrial and celestial, came into being as concepts after their northern equivalents: Greek thinkers initially postulated a flat Earth beneath a spinning hemisphere, a model which required a rotational axis – a πόλος (*polos*) – as well as a northern point where this axis met the outermost part of the heaves – also called *polos*. This was the celestial North Pole, termed the Arctic Pole from its proximity to the constellations of the Great Bear and Little Bear; ἀρκτικός (*arktikos*) means "associated with the bear". The South Celestial Pole came later, by necessity, when a spherical cosmos became the preferred model and was named ἀνταρκτικός (*antarktikos*), "opposite to the bear". The polar circles, at this stage, were also celestial features, indicating the circumpolar stars – stars that rotated around the pole but never set.[23]

The eventual development of the notion of the South Pole as a place intimately connected to the Earth's planetary spatiality was made possible by the convergence of several strands of cultural associations. While the unique associations which the South Pole came to have in the cultural imaginations of relatively recent eras depended in part on the evolution of the very concept within changing geographical, philosophical and mathematical frameworks, the imagining of the pole as a place which one might experience was also informed by broader beliefs about the extremities of the Earth. Initially, these beliefs primarily concerned the North rather than the South Pole, but with the development of a sense of the Earth's symmetry, in particular the symmetrical arrangement of climatic zones, this concept of the poles as places outside of time and history, and as limits of the Earth's spatiality and of human presence, came to apply to both. The full story of these developments in antiquity is impossible to assemble; our sources are often fragmentary or missing entirely, and what emerges from antiquity to the present is a constellation of ideas concerning the nature of the poles rather than a single clear-cut perception.

Though there are relatively few traces of myths concerning the north celestial pole in the Greek and Roman traditions,[24] a playful passage of Plato's *Cratylus* suggests that some may once have existed. In this dialogue's discussion of etymologies, Socrates suggests that the name of Apollo indicates

> moving together in the heavens about the poles, as we call them, and harmony in song, as it is called, because, as those who are skilled in music and astronomy say, all things proceed (πολεῖ) together in a certain harmony.

[23]On the development of ideas concerning the poles in ancient Greek geography and cosmology, see Couprie, *Heaven and Earth*.

[24]Dirk Couprie astutely observes that one would expect there to be numerous myths explaining the apparent "tilting" of the axis of the heavens, though relatively few seem to appear. He cites only a Chinese myth. *Heaven and Earth*, 69.

The first suggested etymology takes the initial *a-* in Apollo's name as "together" and *poll-* as equivalent to *polos*: that is, Apollo is the one "around the pole". A second wordplay on *poll-* and *polei* ("go", "proceed") allows the connection between the harmony of music and the harmony of the heavens[25]: "all things procede together in a certain harmony". None of this etymologising, of course, is correct, but it does assume, without any apparent need for argument or demonstration, a connection between the movement of the heavens around the celestial pole and the musical harmony associated with Apollo.[26]

The observation of the north celestial pole did not depend on any particular cosmological or geographical beliefs, but was readily made from the rotation of the stars around it – even if, prior to precession bringing Polaris conveniently close from late antiquity, there was nothing visible marking the pole itself. It is, therefore, no surprise that the Greek and later Latin terms for the poles (*polos*, *vertex*) signify first the celestial and only later the terrestrial poles. At all periods of antiquity, these words appear far more commonly designating the celestial than terrestrial poles, and on occasion by metonymy the heavens in general. The concept of terrestrial poles depends, of course, on that of an approximately spherical Earth, and at this notion, Greek speculation arrived early. Already in Plato's *Timaeus*, the world which the Demiurge forms is a spherical one,[27] probably reflecting still earlier Pythagorean opinion. This conclusion was not reached in the first instance by observation or calculation but on the basis of the supposed perfection of the sphere as a shape.[28] Against the obvious objection to this position that the Earth was clearly not a regular shape of any kind but had an irregular surface, the response of a somewhat later more empirically grounded geography was to concede that the Earth was not a regular sphere, but that the irregularities did not affect the overall spherical shape.[29]

The bare idea of two terrestrial poles on a spherical Earth would not in itself have found much resonance in the ancient or modern imagination. The first step towards a fuller imagining of what the poles might be like as experienced places is the combination of the idea of north and south terrestrial poles with the increasingly dominant model of five climatic zones. These were relayed to the middle ages by Macrobius, whose *Commentary on the Dream of Scipio* was in its manuscript transmission accompanied by maps depicting these zones.[30] Though Macrobius' geographical discussions make few or no original con-tributions, his work did serve as an important intermediary in the transmission of earlier thought.[31] His zonal schema, which is already present in Eratosthenes, divides the Earth into a central zone, uninhabitable because of its heat; two temperate, inhabited zones, one in the north and one in the south hemisphere; and two frigid, uninhabitable zones in the extreme north and south. The poles lie on this zonal map in the frigid, uninhabitable zone. Macrobius, following Crates of Mallus,[32] theorises that the tides are due to the circulation

[25]*Cratylus* 405c.
[26]Apollo's character as a solar deity, though prominent later, is relatively recently acquired at the time of composition of the *Cratylus*, so is less likely to be a factor in this passage.
[27]Plato, *Timaeus* 33b.
[28]Ibid., 33a–b.
[29]Eratosthenes, *Geography* fragment 30 = Strabo, *Geography* 2.5.5-6. For commentary on this passage, see Roller, *Eratosthenes' Geography*, 144–7.
[30]On these maps, see Hiatt, "Map of Macrobius."
[31]On Macrobius, see Stahl, *Macrobius* and "Astronomy and Geography"; Flamant, *Macrobe et le néoplatonisme latin*; Mras, *Macrobius Kommentar*; and Schedler, *Philosophie*.
[32]Aëtius, *Placita* 3.17.7, attributes this view to Crates.

of water at the poles and rejects the lunar theory of the tides.[33] Beyond this, he gives little detail concerning the poles themselves.

One intriguing fragment of Eratosthenes (fragment 16), however, explicitly addresses the position of the poles in the frigid zone and is the first surviving ancient reference to the poles, which imagines them as places that one might experience. This relatively concrete imagining of a place which we find in this intriguing fragment is in part due to its context. It is not from Eratosthenes' geographical work but from a poem on the god Hermes, which mixed, in Hellenistic fashion, scientific and mythological discourses. In this part of the poem, the newly born god has ascended from the Earth; he sees the planets and hears their harmonies, then looks down on the Earth and sees its various climatic zones:

> And there are two zones, one on each side, fallen around the poles,
>
> always wrapped in ice, always damp with waters.
>
> Not water, but ice itself, fallen from the heavens
>
> Lies on them, and embraces the earth, and builds up cold around it.[34]

The vocabulary of this fragment is vivid and striking, and the symmetrical arrangement of the lines emphasises the unchanging, frigid character of the poles as Eratosthenes imagines them. The two climatic zones have "fallen around" περιπεπτηυῖαι (*peripeptêuiai*) the poles as if they were laid over the top of them. This unusual participle is followed by another rare word, κρυμαλέαι (*krumaleai*), for "wrapped in ice" in the following line. The frigidity of the zones is imagined as piled up around the poles themselves, a point which these lines underscore by their unusual lexical choices (περιπεπτηυῖαι (*peripeptêuiai*), περὶ … ἐτέτυκτο (*peri … etetukto*)). The accumulation of ice is verbally mimicked by the recurrence of *peri*. Eratosthenes' poles are marked, moreover, by their constancy, as the repeated "always" makes clear. This sense that the frozen extremities are unchanging, outside time and history, picks up a view of the cold extremities of the world already present in the Homeric epics. When Odysseus journeys to the land of the dead in *Odyssey* 11, he sails to the north, to the land of the Cimmerians, which is similarly unchanging:

> And the ship came to the limits of deep-flowing Ocean.
>
> And there is the land and city of the Cimmerian men,
>
> Hidden in mist and cloud. And never
>
> Does shining Helios look upon them with his rays,
>
> Neither when he moves into the starry heaven,
>
> Nor when he turns again from heaven to earth,
>
> But a destructive night has been stretched over those unfortunate mortals.[35]

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[33]Macrobius, *Commentarium* 2.9.2–3.
[34]Eratosthenes, *Hermes*, fragment 16, lines 9–12. See Powell, *Collectanea Alexandrina* 62–3 with brief notes. The same fragment, with fuller discussion, is number 19 in Hiller, *Eratosthenis Carminum Reliquiae*, 56–64. For discussion of this poem: Solmsen, "Eratosthenes." Translations are our own.
[35]Homer, *Odyssey* 11.13–19.

It is possible that Eratosthenes' lines deliberately echo these Homeric ones, replacing Homer's repeated negatives with his own repeated "always", but in any case, it is clear that he includes the poles within both a zonal schema and an older sense of what the extreme north and now, by implication, the extreme south, are like.

Despite the sketchiness of the ancient evidence, some general tendencies in these first stages of the development of thinking about the poles become clear. First, there is a consistently close connection between the terrestrial and celestial poles; beyond the overlap of vocabulary, which was not an inevitable development, the mental structure of a spherical universe with a spherical Earth at its centre ensured that the poles of these two spheres were thought to stand in a symmetrical relationship. For the development of some notion of what the poles might be like as experienced places, the zonal theory and the older representation of the far north as a place of cold and lifelessness, outside of seasons and history, at the very limits of the imaginable world, provided a broader set of associations that could then be applied to these specific points.

One tantalising piece of evidence survives that ancient authors imagined the terrestrial poles in fiction. *The Wonders Beyond Thule* by Antonius Diogenes, a novel of the second or early third century CE,[36] is unfortunately lost, but in a substantial summary of the text, the Byzantine bishop Photius (writing in the ninth century) records that in one of its many sub-narratives, a traveller named Deinias told of his journey to the north pole. Here, he claimed to have seen "what the astronomers teach", namely, that it is possible that some people live under the Arctic pole, where night lasts a month or much shorter or longer: a night of six months or a year. And day, he says, can vary just as much. Beyond this, Photius tells us that Deinias related other wonders beyond imagining, but does not specify what these were. He does, however, relate that Deinias claimed that when he and his companions journeyed to the far north, they arrived at the moon, "which was like some purest land". Once more Photius is dismissive of "the sorts of things generally seen by people who imagine such outlandish things" and gives no further information on this part of the text.[37]

What is clear from this remarkable summary is that Antonius Diogenes combined observations of far-northern latitudes, likely drawn from the account of Pytheas either directly or through intermediaries,[38] with some now largely lost elements of fantasy. Most striking of all, however, is the first appearance of the notion that the Earth's poles might be a gateway to another world, in this first instance, the moon. This is an idea which would have a modern revival, and whether or not modern ideas of the poles as connections to other worlds developed in awareness of Antonius Diogenes, both the ancient and the modern concept depend on the shared notion that the poles are (inter)planetary points, privileged loci for understanding the Earth in its relation to the cosmos at large.

[36]The work has generally been dated to the second century in the belief that Lucian's *True History* parodies it, and that later Greek novels of travel and adventure draw upon it (as Photius already believed). See on this text Morgan who questions whether Deinias is supposed to have visited the moon or merely to have seen it from close by from the north pole ("Lucian's True Histories," 478). Photius' summary is too compressed to be sure.

[37]See Photius, *Biblotheca* 166–185 for this summary of Diogenes Antonius.

[38]Pytheas of Massilia travelled to Britain and "Thule". This is possibly Iceland, but nothing is certain about its location (Cunliffe, *Pytheas*, 116–133) beyond its position in the frozen north. Pytheas' account was used by Eratosthenes but rejected by many of Eratosthenes' successors, including Strabo. Since Strabo offers our main account of Eratosthenes' lost *Geographica*, and since he seems to have excised any material he believed to be from Pytheas, it is very difficult to reconstruct much of Pytheas' text. See Roller, *Eratosthenes' Geography*, 18.

Speculative topologies and the polar planetary romance

Knowledge of high latitude regions from the early modern period to the beginning of the twentieth century was in a state of uncertainty conducive to literary narratives in the fantastic and utopian vein[39]: no longer the utter blanks they had been to previous eras, the Arctic and Antarctic regions nonetheless remained largely unexplored and unmapped. The geographic poles continued to be objects of pure speculation, with many of the ideas proposed by classical thinkers still in circulation.

Perhaps the most prominent of these speculations was the theory of the "Hollow Earth". The idea that the planet's core might not be solid had some currency in the seventeenth century, with Jesuit philosopher Athanasius Kircher proposing a model of the Earth based on the human body, with nutrients in the form of sea water sucked in at the north and discharged at the south, and astronomer Edmond Halley proposing a series of rotating spheres within the Earth to explain the wandering of the magnetic poles.[40] The theory attained considerable fame – and notoriety – in the early nineteenth century due to the efforts of retired US army captain John Cleves Symmes, who vigorously promoted the notion of a habitable planetary interior consisting of concentric spheres – a model of inner space that, as Victoria Nelson has pointed out, inverts the cosmology of outer space put forward by the early Greeks.[41] Symmes believed the Earth's hollow core could be accessed via vast holes at either pole surrounded by rings of ice and called for support for his plan for an exploratory expedition to the Arctic in search of a temperate and abundant interior land.

Symmes' model, then, casts the poles not – or not only – as ends of the Earth but as portals to one of the "other" spaces identified by Olson and Messeri. Hester Blum examines Symmes' various manifestos – which insistently appeal to "the world" rather than his own nation – as an antidote to the twenty-first-century scramble for potential polar resources:

> Reading Symmes reminds us that the polar regions can refract conversations about planetarity along unexpected trajectories … The polar regions hold our interest not just as environments that have been unresponsive to usual manners of occupancy, locomotion, and development, but also as imaginative and critical resources for visionary reorientation.

Symmes' holes render the very concept of a terrestrial pole – the point where the Earth's axis meets its surface – redundant, forestalling, as Blum points out, the planting of a national flag on the precise spot. For Blum, Symmes' speculative and supranationalist vision points to the ability of a "polar vantage point" to enable the planet to be viewed outside familiar systems of exchange.[42]

While the Symmesian "Hollow Earth" and subterranean fiction tradition it inspired continue to attract critical attention, a parallel imaginative tradition of the poles as points of interplanetary connection remains fairly obscure. Yet one of the earliest novels to imagine interplanetary travel – *The Description of a New World called the Blazing World* (1666), by Margaret Cavendish, Duchess of Newcastle – took the North Pole as the connecting point. Often claimed as the first science fiction narrative written by a woman, *The Blazing World* is

[39]David Fausett points to the "interplay of ignorance and knowledge" in early fiction set in the antipodes. *Images of the Antipodes*, 10.
[40]Peter Fitting's *Subterranean Worlds* is an excellent compendium of different visions of the "Hollow Earth".
[41]Nelson, "Symmes Hole," 149.
[42]Blum, "John Cleves Symmes," 249, 246–7, 266.

more heterogeneous than this classification might suggest, combining elements of fantastic voyage, utopia, satire and several other genres. The tale begins on an alternative version of Earth that is connected with the eponymous world at the former's icy north pole. Cavendish's "young lady" protagonist, abducted by an amorous merchant, finds herself the sole survivor on a boat "driven to the very end or point of the Pole of the World, but even to another Pole of another World, which joined close to it". However, the narrator's further explanation of the heroine's passage between worlds suggests not simply adjacent planets but a far stranger topology in which both poles are portals from one planet to another:

> the Boat still passing on, was forced into another World; for it is impossible to round this Worlds Globe from Pole to Pole, so as we do from East to West; because the Poles of the other World, joining to the Poles of this, do not allow any further passage to surround the World that way; but if anyone arrives to either of these Poles, he is either forced to return, or to enter into another World.[43]

Siobhan Carroll reads Cavendish's "distorted vision of polar space" much as Blum reads Symmes': as an attempt to claim the polar regions as spaces of imagination, rather than imperial or commercial exploitation.[44] As Carroll points out, the doubling of the two planets reflects a doubling in the heroine, who realises she can create a "Celestial World" of imagination within herself, superior to the "Terrestrial World" outside.[45]

Cavendish's planetary schema includes, moreover, not two but three bodies, as it also incorporates Earth, home to "The Duchess of Newcastle" (a fictionalised version of Cavendish herself) and physically separate from the two interconnected planets. At one point, the heroine, now Empress of the Blazing World, asks her "Experimental Philosophers" to describe the view from the southern pole, as seen through their telescopes (impossible if the two worlds are simply adjacent). They describe a constellation of three stars, two bright and one dim, that correspond extratextually to those reported in the Earth's southern hemi-sphere skies by explorers, but also mirror the three planets of the narrative.[46] This polar view of the southern hemisphere skies is thus simultaneously the narrative's representation of its own story world. The poles, Cavendish's tale suggests, simultaneously enable movement outward into space and inward to self-knowledge.

The conceit of twin planets joined at their poles was employed a century and a half later by Thomas Erskine, a prominent British barrister who was once Chancellor of the Exchequer, in his two-volume utopia *Armata* (1817). Erskine inverts Cavendish's model, sending his protagonist to another planet apparently attached to Earth's South Pole. A sailor travelling from New York to China via New South Wales is blown off course and finds his vessel sucked by a current into a narrow channel. This takes him to what is eventually revealed as a second world, Deucalia. More interested in political and social satire than astronomy or geodesy, Erskine devotes comparatively little space to the physical details of the arrangement, although the narrative confirms that Earth and Deucalia are like a "double-headed shot" with the poles of each planet pointing in opposite directions and are joined by two sea channels

[43]Cavendish, *The Blazing World*, 61–2.
[44]Carroll, *Empire of Air and Water*, 26.
[45]Ibid.; and Cavendish, *The Blazing World,* 123.
[46]Cavendish, *The Blazing World*, 78; and Spiller, "Reading Through Galileo's Telescope," 216.

flowing strongly either way between them, which are themselves tens of thousands of miles long.[47] Erskine's choice of the South Pole as his connecting point signals his primarily satirical intent: sitting underneath the Earth, Deucalia provides an inverted spatiality in which the author can criticise his own northern hemisphere home.

Erskine's companion planet was evidently in H.G. Wells' mind when, in *A Modern Utopia* (1905), he argued that the political and economic conditions of modernity made the fictional premise of an enclosed space on Earth impossible. There is, as Wells claims,

> no room for a modern Utopia in Central Africa, or in South America, or round about the pole, those last refuges of ideality … We need a planet. Lord Erskine … joined his twin planets pole to pole by a sort of umbilical cord. But the modern imagination, obsessed by physics, must travel further than that.[48]

Gustavus Pope's *Journey to Mars* (1894) bears out Wells' observation, replacing Erskine's long sea channels with interplanetary "cosmo-magnetic currents" that link the poles of all the planets in the solar system.[49] The first of a planned series entitled *Romances of the Planets*, the novel was part of a spate of Martian fiction following the identification of apparent canals on Mars – which Pope's narrative explains as a series of linear cities – and is remembered now largely for its evident influence on Edgar Rice Burroughs (himself no stranger to subterranean or high latitude fiction).

Pope employs a manuscript-found-in-a-bottle frame narrative typical of nineteenth-century Antarctic fiction, although in this case, the "bottle" is a cylinder made of a strange unbreak-able metal. The inner narrative tells the adventures of a U.S. naval officer, Lieut. Frederick Hamilton who, along with a Maori crewman called John, encounters a strange people in an open Antarctic sea. Eventually learning that these people have journeyed to the Antarctic from their home world of Mars, the two men travel with them back to their planet's south pole. Hosted by Martian royalty, they enjoy a series of fabulous and dangerous adventures before learning that Mars itself is in danger of a cataclysmic meteor strike – at which point, they return to Earth in readiness for a mass evacuation, only to travel back to Mars' north pole to thwart an opportunistic takeover by a rival king. This open ending prepares the way for the second (and, as it turned out, only other) title in Pope's series, *Journey to Venus* (1895).

The interplanetary vision presented in *Journey to Mars* does very little to challenge the protagonist's existing worldview: his account of outer space emphasises sameness rather than difference, with Martian society surpassing but rarely bringing into question Hamilton's own. Only the Martians' vegetarianism makes Hamilton examine (briefly) his ideologi-cal assumptions. By contrast, his frequently expressed US nationalism and belief in white superiority are accepted, mirrored and reconfirmed by the Martians he encounters, who are themselves obsessed with racial purity.[50] In this way (and many others), the novel is unremarkable, sharing the racial anxieties that also characterise the lost-race genre out of which the planetary romance evolved.

Within the development of the Antarctic imagination, however, *Journey to Mars* is nonetheless significant. Generically, it marks a shift from a primarily gothic register (epitomized

[47]Erskine, *Armata*, vol. 1, 7; vol. 2, 46.
[48]Wells, *A Modern Utopia*, 22–3.
[49]Pope, *Journey to* Mars, 90. Little is known of Pope other than details included in the novel's title page and note he was a medical doctor who lived in Washington, D.C. His cosmic model in *Journey to Mars* seems to conflate the magnetic and geographic poles.
[50]Ibid., 267, 279, 294–5, 326, 227, 362.

by Poe's *Narrative of Arthur Gordon Pym*) to a science fictional one and establishes a literary link between Antarctica and Mars that was explored by many later writers (most prominently Kim Stanley Robinson). The Hollow Earth tradition is evoked only to be dismissed by the narrative. Lacking any other explanation for the existence of a new people in the South Polar region with no awareness of the rest of the world, Hamilton initially assumes that the Martians come from the Earth's interior, before discovering their extraterrestrial origin. His own initial journey to the open polar sea also itself evokes the Hollow Earth: through a series of accidents, he, John and another crew member become separated from the expedition and find themselves trapped in a cavern created by two coalescing icebergs. This terrifying interior space, which they endure for about a month, is blasted open inad-vertently by the Martians testing out their explosives. Metafictionally, the scene suggests that Pope's narrative blows away Hollow Earth fiction in favour of the planetary romance. The device of the cosmo-magnetic currents, which allow faster-than-light travel, as well as a kind of instantaneous telegraphy akin to telepathy, means that these planetary places act as portals, similar to the shortcuts enabled by space-time singularities in later science fiction.

In *Journey to Mars*, then, the poles symbolise communication and interaction rather than isolation. This is particularly interesting given the novel's publication in 1894, a time when explorers of several nations were gearing up for attempts at reaching the poles. In the north, expeditions led by Robert Peary were achieving a series of "farthest norths", while in the south, the first "official" landing on the Antarctic occurred in 1895, with the first serious overland journey towards the South Pole, in an expedition led by Robert F. Scott, occurring seven years later. At a time when these efforts to reach Earth's ends were afoot, Pope's novel reimagines the poles not as ends, but as connectors – joining points in interplanetary rela-tionships, ways of imaginatively moving beyond an isolated Earth.

Conclusion: inhabiting the planet at its turning point

At the outskirts of the present-day Amundsen-Scott South Pole Station stands a strange, evocative monument: a series of giant cable spools placed along a line in stacks of one, two or three (Figure 1). Silhouetted against the polar dawn, with the plateau stretching out around it, "Spoolhenge" bears an obvious physical resemblance to its namesake on Salisbury Plain. The resonances, however, go beyond this. The cables originally spun around the spools were used for scientific experiments at the Pole, including the IceCube Neutrino Observatory.[51] Installed at a cost of USD279 million, this detector effectively uses the ice itself – about a cubic kilometre of it – as a giant telescope. An array of over 5000 devices buried up to 2.5 km into the ice detect the rare collisions of the unimaginably tiny, uncharged neutrinos with other particles, which in turn provide information about their astronomical sources. Spoolhenge thus playfully marks the South Pole as planetary place in the most contemporary sense, while tying it back to prehistoric observations of the stars.

The material inhabitation of the Pole is sometimes read as the death knell to its imag-inative potential. In his documentary *Encounters at the End of the World* (2008), Werner Herzog pans across the scattered buildings, flags and scientific structures at the Geographic

[51] Warren DeMian, "IceCube South Pole Neutrino Observatory Wins 15 at the Pole," University of Wisconsin-Madison, http://icecube.wisc.edu/news/view/300.

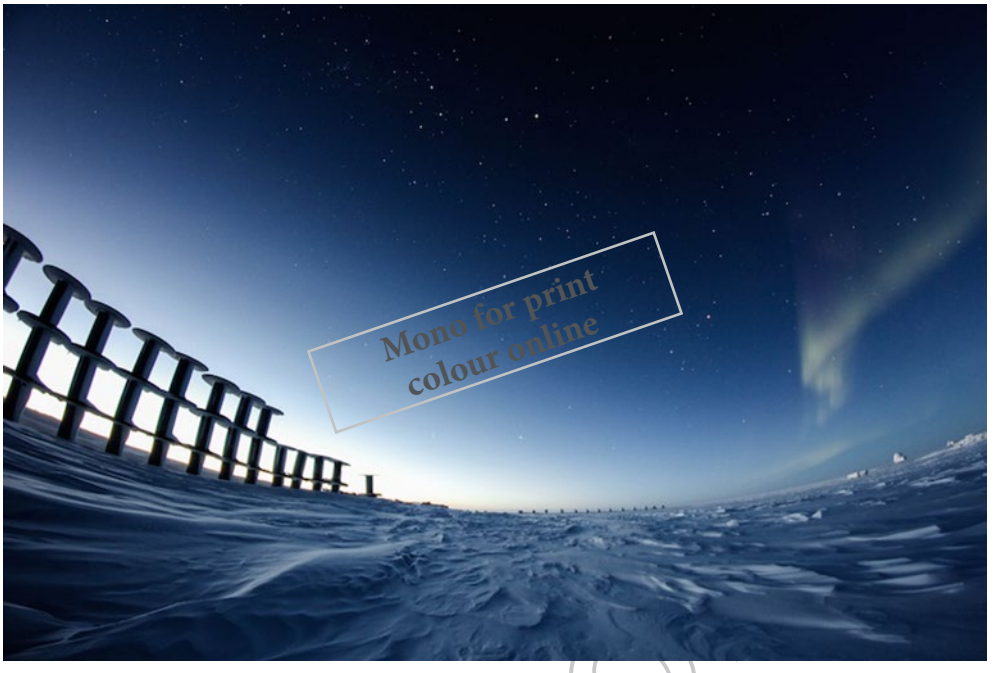

Figure 1. "Spoolhenge" at South Polar "dawn", early September 2013. A faint aurora can be seen on the right. Photo: Marie McLane.

South Pole while regretting it was ever reached: "at a cultural level", he suggests, this meant "the end of adventure". Certainly, the establishment and running of a station at the Pole, by a nation that recognises no claims to Antarctica but reserves the right to make its own, is an ongoing demonstration of geopolitical power at the continent's symbolic heart.[52] Inasmuch as it represents "Big Science" conducted in the harshest of conditions, the dominance of astronomy at the South Pole – not just IceCube but the more visible South Polar Telescope and various other projects – consolidates this power.

Nonetheless, although both poles are now known, mapped and understood places on Earth, and the South Pole is home to a small, if transient, community, they maintain the dual function of revealing Earth's planetarity and directing beyond it. Although the construction of Amundsen-Scott South Pole Base was politically strategic, it was also motivated by the Pole's ability to provide insight into both the planet and the cosmos – that is, its long-held position as a planetary place.[53] The cosmological experiments performed there can be understood as a continuation, rather than a replacement of the imaginative visions we have discussed. IceCube, which "looks" "up" towards the Earth's north but also "down" into the ice and thence the centre of the planet, and the South Pole Telescope, which "looks" "down" from the underside of the Earth but also "up" into the stars, help to build an understanding of a cosmic environment in which anthropocentric concepts inevitably make little sense, which in turn forces further defamiliarization of the planet and its inhabitants.[54] This

[52]See Leane, *South Pole*, ch. 8.
[53]Much of the science performed at the South Pole is focused not on the place itself but what can be seen from it, via astromony,
seismology, the drilling of ice cores and other methodologies. See Leane, *South Pole*, ch. 7.
[54]Neither IceCube nor the SPT is an optical telescope in the conventional sense; the SPT is a radio telescope.

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newest phase in its natural-cultural history, layered ironically on older visions of routes to Earth's interior and portals to outer space, reinforces the centrality of the South Pole – and by necessity its northern counterpart – to any consideration of the "planetary turn".

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